

Pacific Coast Groundfish Fisheries

INTRODUCTION

The groundfish fishery off Washington, Oregon and California is conducted across a diverse range of habitats and involves tens of species and several fishing gears. Domestic landings averaged about 30,000 t per year prior to the early-1970s. A foreign fishery began in the early-1960s for Pacific ocean perch and Pacific whiting. The long-lived Pacific ocean perch stock is still recovering from excessive foreign harvests that occurred during the 1960s, but the fishery for the more produc-

tive Pacific whiting stock evolved into a healthy joint venture, then wholly a domestic fishery, in 1991. By 1977, when work by the Pacific FMC on the Groundfish FMP was initiated, domestic landings of all groundfish had increased to 60,000 t and by 1982, when the FMP was implemented, landings peaked at 116,000 t. The recent average yield of non-whiting groundfish has returned to an average of about 70,000 t which appears to be sustainable for several of the species involved. However, many of the stock assessments do not have sufficient data to be precise, and substantial natural fluctuations occur in some species.

Several assemblages of fish contribute to the \$81.6 million groundfish fishery in 1994 (Fig. 15-1). The midwater trawl fishery for Pacific whiting dominates the tonnage and whiting as a single species contributes the greatest value (\$18.9 million ex-vessel value in 1994). A deepwater trawl fishery for sablefish, thornyheads, and Dover sole now operates out to near 1500 m. This trawl fishery and a longline and pot fishery for sablefish was worth \$33.9 million in 1994, with sablefish and thornyheads each contributing about 40% of this total. On the continental shelf and extending into the nearshore reef habitat is a trawl and hook & line fishery for tens of rockfish (*Sebastes*) species that was worth \$20.2 million in 1994. Widow and yellowtail rockfish each contributed about 20% of this total value. An associated species is lingcod with landings worth \$1.7 million in 1994. In addition, lingcod and some species of rockfish have substantial recreational harvests in some areas. Catch of nearshore flatfish was worth \$6.1 million in 1994, with 40% coming from Petrale sole. Fishing and processing participants in the groundfish fishery also commonly participate in fisheries for shrimp, halibut, Dungeness crab, salmon, and albacore tuna. In 1993, the groundfish fishery contributed \$70 million out of the total \$191 million for these named fisheries.

Table 15-1. Pacific Coast Groundfish

Productivity in metric tons and status of fisheries resources

Species	Recent Average Yield (RAY) ¹	Current Potential Yield (CPY) ²	Long-Term Potential Yield (LTPY)	Fishery Utilization Level	Stock Level Relative to LTPY
Pacific whiting ³	189,765	223,000	336,000	Full	Below
Sablefish	8,298	9,100	9,800	Full	Near
Ling cod	1,985	2,400	3,100	Over	Below
Pacific cod	1,336	3,200	Unknown	Under	Unknown
Flatfishes					
Arrowtooth flounder	3,173	5,800	Unknown	Under	Unknown
Dover sole	13,170	15,000	16,300	Full	Below
English sole	1,424	3,100	3,100	Under	Above
Petrale sole	1,445	2,700	2,700	Full	Near
Other flatfish	2,058	7,700	Unknown	Unknown	Unknown
Rockfishes					
Bocaccio	1,401	1,700	1,800	Full	Below
Canary rockfish	1,926	1,250	1,250	Over	Below
Chilipepper rockfish	1,362	4,000	4,000	Under	Above
Pacific ocean perch	1,101	Unknown	1,100	Over	Below
Shortbelly rockfish	37	23,500	23,500	Under	Above
Thornyheads	8,482	8,000	6,600	Full	Near
Yellowtail rockfish	5,177	6,740	6,700	Full	Above
Widow rockfish	6,629	7,700	6,700	Full	Near
Other rockfish ⁴	9,110	11,500	Unknown	Full	Unknown
Other fish	4,578	14,700	Unknown	Unknown	Unknown
Total	262,457	352,191	465,550		

¹ RAY is the average 1992-94 landed U.S. commercial catch.

² CPY is taken from the Pacific FMC's Acceptable Biological Catch for 1995.

³ Pacific whiting RAY for U.S. + Canada was 284,694 t, including discards.

Pacific whiting CPY and LTPY are for combined nations. Prorated U.S.

portion of Pacific whiting CPY = 178,400 t and LTPY = 268,800 t.

⁴ Significant recreational catches include 1,080 t lingcod, 200 t bocaccio, and 5,000 t of other rockfish including 600 t of black rockfish in Oregon and Washington.

MANAGEMENT SITUATION

Recommendations for management of the Pacific coast groundfish fisheries are developed

by the Pacific FMC. The Groundfish FMP calls for establishment of an annual ABC and Harvest Guideline (HG) for major groundfish species. Although brief, “derby” fisheries of a few weeks duration have been used for a portion of the whiting and fixed gear sablefish harvests, most elements of the fishery have a goal of year-round fishing opportunity. Achievement of a year-round fishing opportunity in the face of excessive fishing effort has been achieved by imposition of limits on individual vessels. These limits have evolved from per trip limits for widow rockfish beginning in 1983, to monthly cumulative limits for each vessel for each of several species today. Inseason adjustment of these limits has been mostly successful in keeping the annual harvest close to the HG while allowing year-round fishing opportunities. However, some abrupt changes to the limits have been disruptive to the industry, and the restrictive nature of these limits causes discard of excessive catch. The expected level of discard (8-20%) is taken into account when setting the annual HG below the ABC. Development of observer programs to estimate the amount of discard, biological studies to determine the mortality rate of discarded fish, and study of co-occurrence patterns among species are needed.

In 1994 a limited entry (LE) program was implemented for the groundfish fishery. The transferable LE permits have endorsements for vessel size and primary gear in order to maintain the existing fleet composition. A formula for combining permits from smaller vessels into a single permit for a larger vessel has allowed several large (>200 ft.) catcher-processors to buy permits and participate in the Pacific whiting fishery. Implementation of the LE system has been beneficial in creating a well-defined set of participants, but it has not decreased the number of participants sufficiently to allow for increases in the monthly vessel limits. Non-permitted vessels may participate in a small-scale, open access fishery.

Other major restrictions on the groundfish fishery include a minimum mesh size on trawls to allow escapement of undersized fish, and area/season restrictions on the whiting fishery to decrease bycatch of salmon.

SPECIES AND STATUS

The Pacific coast groundfish fisheries are generally managed with a constant proportional rate of harvest such that the expected level of

egg production (or spawning biomass) per recruit will be 35% of the unfished level. The exception is Pacific whiting which has a more conservative and varying harvest rate in recognition of the extreme natural fluctuations in recruitment. Because many groundfish species have longevity in the 40-100 year range, the annual exploitation rates that achieve the spawning biomass per recruit goal are often as low as 5-10%. Thus, it has taken many years for these low exploitation rates to reduce the stock abundance from the lightly exploited levels of the 1960s to the fully exploited levels of today. Reductions in recommended annual harvest amounts over the past decade for sablefish, widow rockfish and some other species has been a direct result of this “fishing down” of the

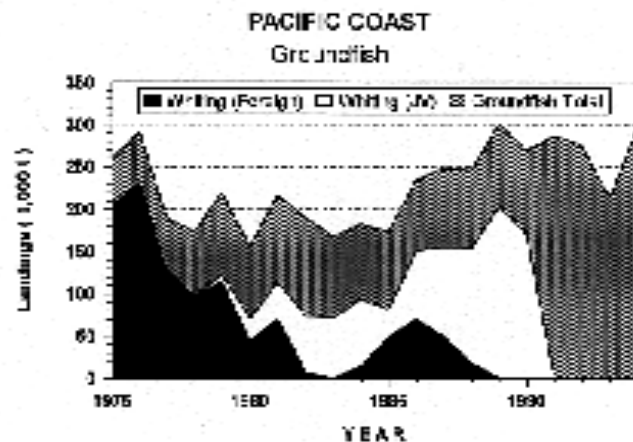


Fig. 15-1 Pacific coast groundfish landings.

surplus biomass. In no case has the fishing down been smoothly along a constant rate of exploitation. Rather, imprecise stock assessments, insufficient staff to revise assessments frequently, and natural fluctuations in abundance contribute to changes in recommended harvest levels.

The groundfish stocks are generally fully utilized (Table 15-1), although a few species such as shortbelly rockfish and jack mackerel remain essentially unutilized because of lack of market. Pacific whiting is fully utilized, but its abundance has been on a decline because of lack of strong recruitment since the 1984 yearclass.

Pacific Whiting Landings (t)

1993	141,200
1994	252,700

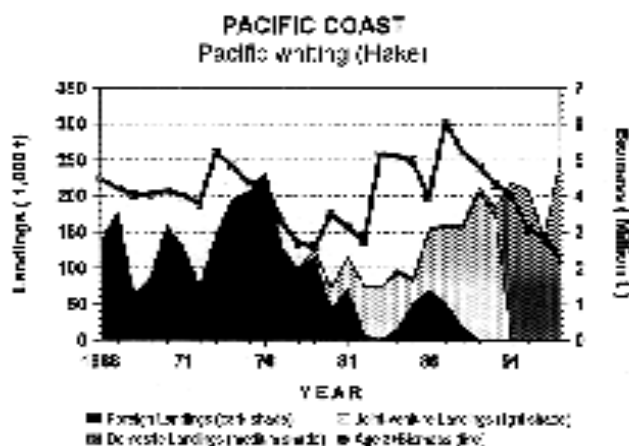


Fig. 13-2. Pacific whiting landings and biomass (ages 2 and older) in the U.S. EEZ of the Pacific coast.

**Pacific Coast
Other Groundfish
Landings (t)**

1993	71,400
1994	62,000

The four species in the deepwater fishery are near full utilization. Within this set, sablefish abundance and RAY appear near long-term potential levels, Dover sole abundance appears to have declined below target levels because of low recruitment in southern areas and because of high exploitation

during the mid-1980s off Oregon. The abundance of shortspine thornyheads appears to be below its target level, and the deeper living, smaller bodied longspine thornyhead has not yet been fished down to its target level. However, the assessments for all four of these species have considerable uncertainty, and the sablefish assessment has been subject to a high level of scrutiny and criticism from the fishing industry.

Within the set of rockfish, widow rockfish is relatively stable near its target level of abundance and yield. Off California, chilipepper rockfish have had a large recent increase in recruitment, while bocaccio continue to decline with reduced recruitment since the 1977 yearclass. Off Oregon and Washington, canary rockfish has declined substantially in recent years due partly to overharvest resulting from imprecise stock assessment information. A reduced harvest guideline and new vessel limits were established for canary rockfish in 1995. In that same area, yellowtail rockfish appears healthy and at a high level of abundance due to recent high recruitment. Pacific ocean perch appears to be only slowly rebounding from

overharvest that occurred in the 1960s. The current level of catch, intended as bycatch in other groundfish fisheries, is near the overfishing level of exploitation. Black rockfish, an important recreational species off Oregon and Washington, appears fully utilized and probably is near its target level of abundance. However, the precision of all these rockfish assessments appears low given the amount of available information. For other species of rockfish, no estimates of abundance and exploitation rates are available.

A first time assessment for lingcod in the northern area indicates that harvest over the past decade has bordered on overfishing; so in 1995 reduced harvest guidelines and new vessel limits were imposed.

Among the other flatfish species, English sole appears to be at a high level of abundance due to large recent recruitments, and Petrale sole is near its target level of abundance and yield.

RECREATIONAL FISHERIES

The non-salmon recreational fishery harvests a diverse collection of nearshore fishes, including many species of groundfish managed by the Pacific FMC. Coastwide sampling of the recreational fishery resumed in 1993 after a three year break. Analysis of recreational fishery data from 1993 and 1994 is underway at this time, and more complete reporting will be included in future volumes of this report. Valuation of the recreational fishery for groundfish is important, but more difficult than estimating the magnitude of the catch. In some cases, proxy values from the recreational fishery for salmon have been used in estimating the economic impact of changing regulations for the recreational groundfish fishery.

Among the groundfish species, the recreational component is particularly important for lingcod and some species of rockfish. Off California, the catch of lingcod by recreational fishermen is approximately equal to that of the commercial fishery. In 1993, the recreational catch of rockfish off California was 4.7 million fish. This may represent approximately 5,000 t, so is of comparable magnitude to the 7,000 t of rockfish (excluding thornyheads and widow rockfish) harvested by the commercial fishery in California in 1993.

Off Washington and Oregon, the charter boat fishery has relied on black rockfish to offset declining opportunities to fish for salmon. In

recent years, the recreational catch of black rockfish has been about 300 t in each of these states. Commercial catch of black rockfish has been less than half of this level. The Pacific FMC has supported initiatives to provide long-term protection for this recreational fishing opportunity by recommending spatial segregation between recreational and commercial fisheries for black rockfish, and by imposing restrictive trip limits and bag limits on the commercial and recreational fisheries, respectively.

Landings

The landed catch of most species is well-monitored through a system of State fish landing receipts and collation of computerized copies of these receipts into the centralized Pacific Fisheries Information Network (PacFIN) database. Unfortunately, funding for biological sampling of the landings is inadequate, so the species composition of mixed rockfish landings is not well known, and size and age composition data are not adequate for many species.

The combined nation (Canada-U.S.) harvest of Pacific whiting reached a record level of 358,900 t in 1994 (of which 252,700 t were caught in the U.S., Fig. 15-2). The increase in 1994 was due to a new stock assessment based on an expanded and improved survey. However, the stock's abundance continues to decline due to recent reduced recruitment, and current projections for available total yield in 1996 are below the 114,000 t average level that occurred during 1978-83.

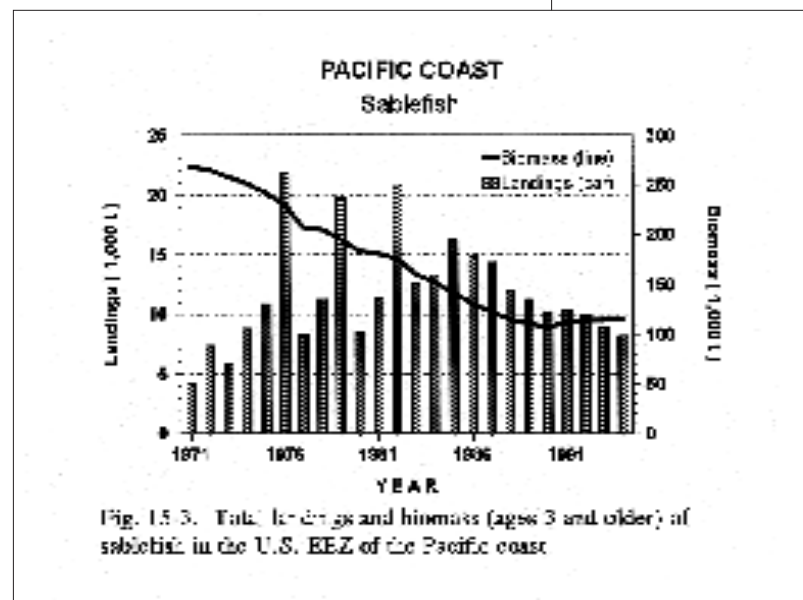
The landed catch of non-whiting groundfish averaged 85,000 t per year during 1985-1990, then declined to about 62,000 t in 1994 as several major stocks were completing the process of being fished down to long-term target levels of abundance (Fig. 15-1). Nearly 10,000 t of this decline in annual yield is due to Dover sole, with much of the remainder contributed by sablefish (Fig. 15-3) and widow rockfish. Table 15-1 documents the recent average yield.

ISSUES AND PROGRESS

Balancing Between Competing Users

Management of the Pacific coast groundfish fisheries involves old and new allocation issues. The Pacific whiting available yield is allocated first between the U.S. and Canada, and

then between shoreside and at-sea deliveries within the U.S. The U.S. and Canada have not come to full agreement on the allocation, with the U.S. now setting its harvest guideline at 80% of the overall ABC, and Canada setting its harvest guideline such that it will be 30% of the combined harvest guidelines. This overharvest may have contributed to the stock's decline in recent years. The sablefish harvest guideline is allocated between a Native American fishery, an open access fishery, limited entry trawl, and limited entry fixed gear. The allocation between limited entry and open access is by a fixed percentage for each species as established in the FMP, but the level of allocation to open access



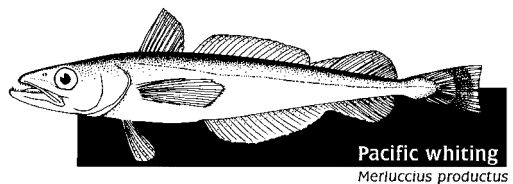
has the potential to become more contentious for lingcod and some rockfish. Direct allocation between recreational and commercial fisheries has not occurred, however recent actions on black rockfish have been designed to preserve recreational fishing opportunities for this species.

Indirect allocation between high capacity and low capacity participants affects many management issues. For whiting, the direct allocation between a brief at-sea fishery and a protracted fishery for shoreside deliveries is partly a consequence of this issue. For fixed gear sablefish, the debate in recent years has been between a ever-shortening derby fishery, movement to an ITQ fishery (which could favor high capacity participants), or movement to a protracted trip-limit fishery (which could favor low capacity participants). For trawlers, the

decline in trip limits over the past decade has had the greatest impact on the vessels that already invested in advanced harvesting capability, yet did not greatly deter other vessels from increasing their capability.

Bycatch considerations have not much entered into allocation arguments, partly because the lack of a comprehensive at-sea observer program has hindered collection of data on the magnitude of bycatch. For example, past arguments on trawl/fixed gear allocation of sablefish hinged on unanswerable questions regarding whether sablefish was a target fishery for trawlers, or unavoidable bycatch as they targeted other species. More recently, an estimate of Pacific halibut bycatch in the groundfish trawl fishery has increased the potential for this to become a new allocation issue. Both of these issues need better estimates

of the amount of discard, and the survival rate of discarded fish.



Pacific whiting
Merluccius productus

Ecosystem Considerations

Accurate, long-term predictions of potential yield will require a substantial increase in our knowledge about competitive and predatory interactions in the biological system that includes Pacific coast groundfish, and about climate effects on this community. The target exploitation rate for most

groundfish species is designed to achieve a large fraction of maximum potential yield, while reducing the abundance of spawners by about 2/3, yet not much reducing the mean recruitment level. Only decades of monitoring the stock's performance will ascertain the long-term feasibility of these targets, and the degree of natural fluctuation that will occur while maintaining these targets. Unfortunately, there is little historical data, and the current level of stock assessment data is not adequate to precisely track changes in abundance for more than a few species. In addition, only a low level of effort is directed towards food habits studies that may help predict how the interactions among species may change as the abundance of several major species is reduced below unfished levels.

Models of long-term potential yield depend on assumptions of constant average environmental conditions or an ability to predict changing conditions. There is evidence of a decline in zooplankton abundance within the 40 year time CalCOFI time series, and evidence of an ocean warming during the late-1970s. Dover sole in southern areas and bocaccio rockfish exhibit declines in mean recruitment during this same period. Better understanding of potential linkages between fish recruitment and long-term changes in the ocean climate are key to improved 5-10 year forecasts of fishery potential yield. □